National Transportation Safety Board

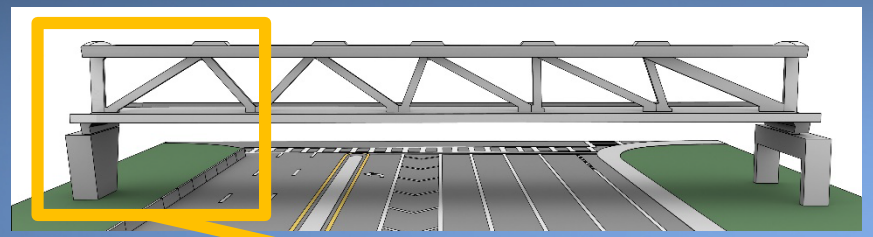
Evidence Testing and Results

Adrienne Lamm

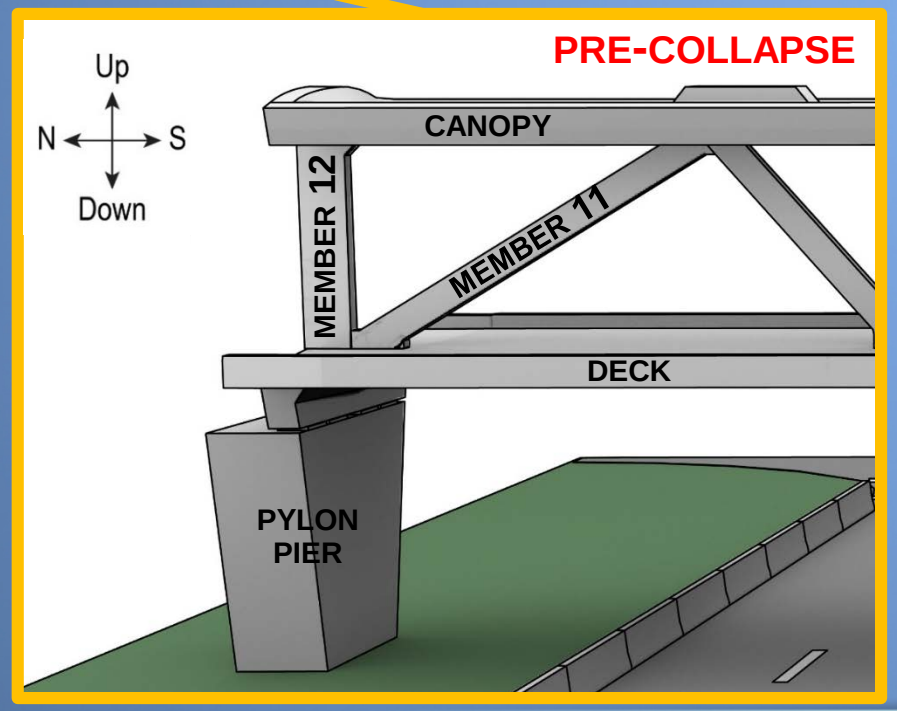
Overview

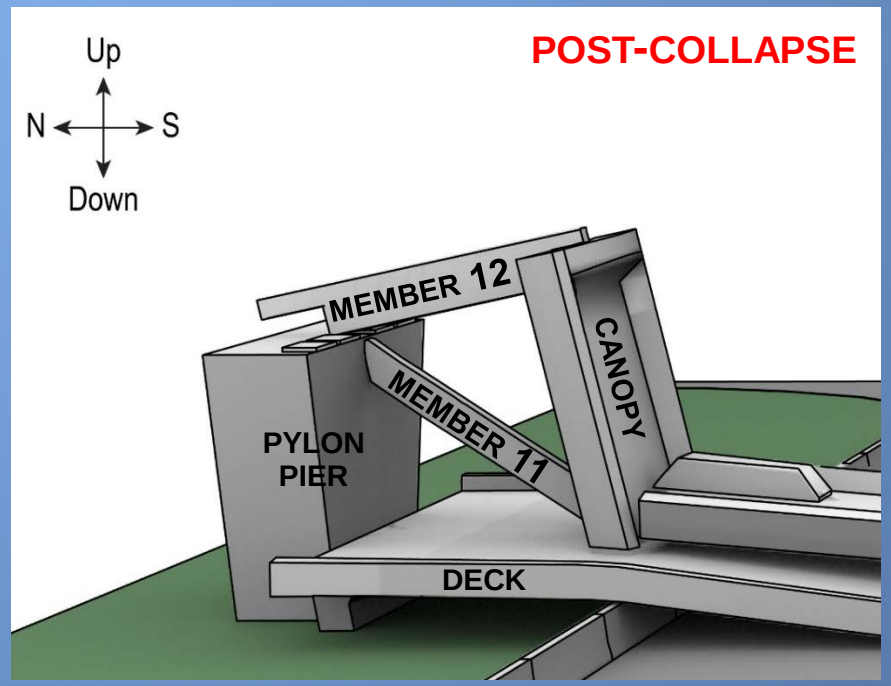
- On-scene evidence collected
- Testing results
  - Concrete
  - Steel PT rods and reinforcement bars
  - Post-tensioning hydraulic equipment
- Surface roughness examination

Main Span North End Structure Position



North end mostly intact, rotated 90 degrees downward





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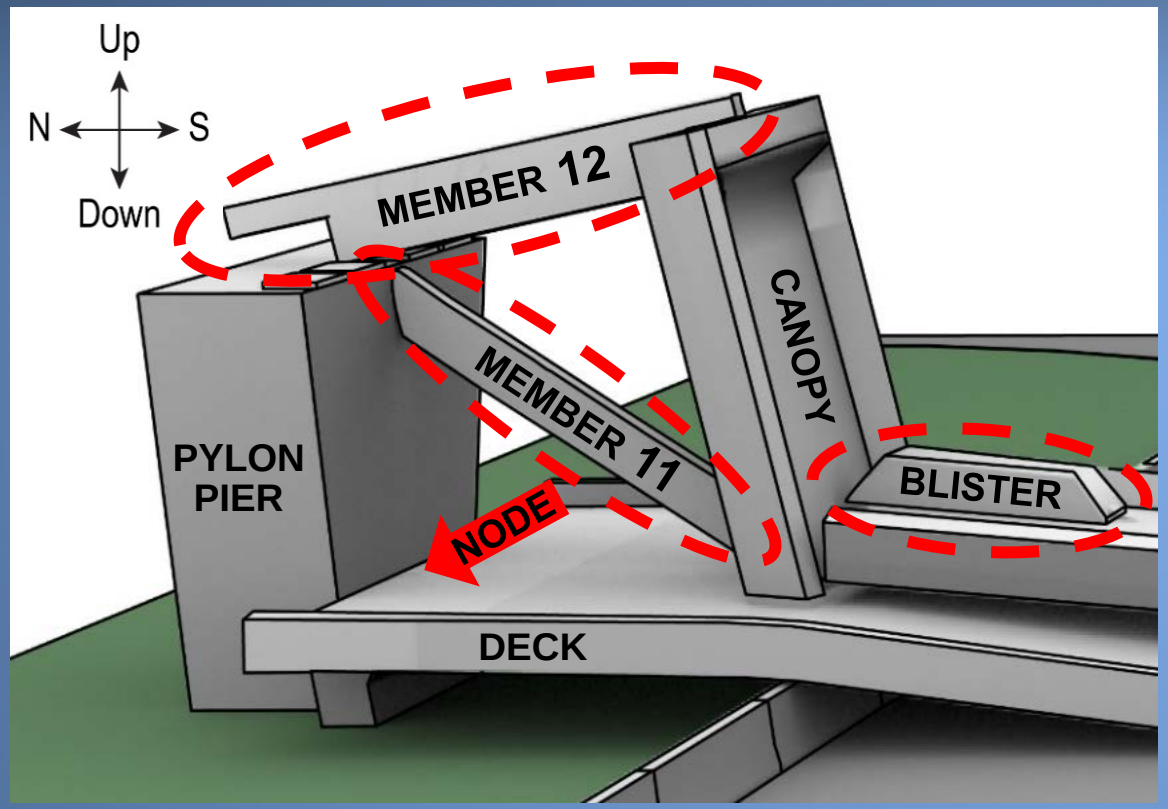
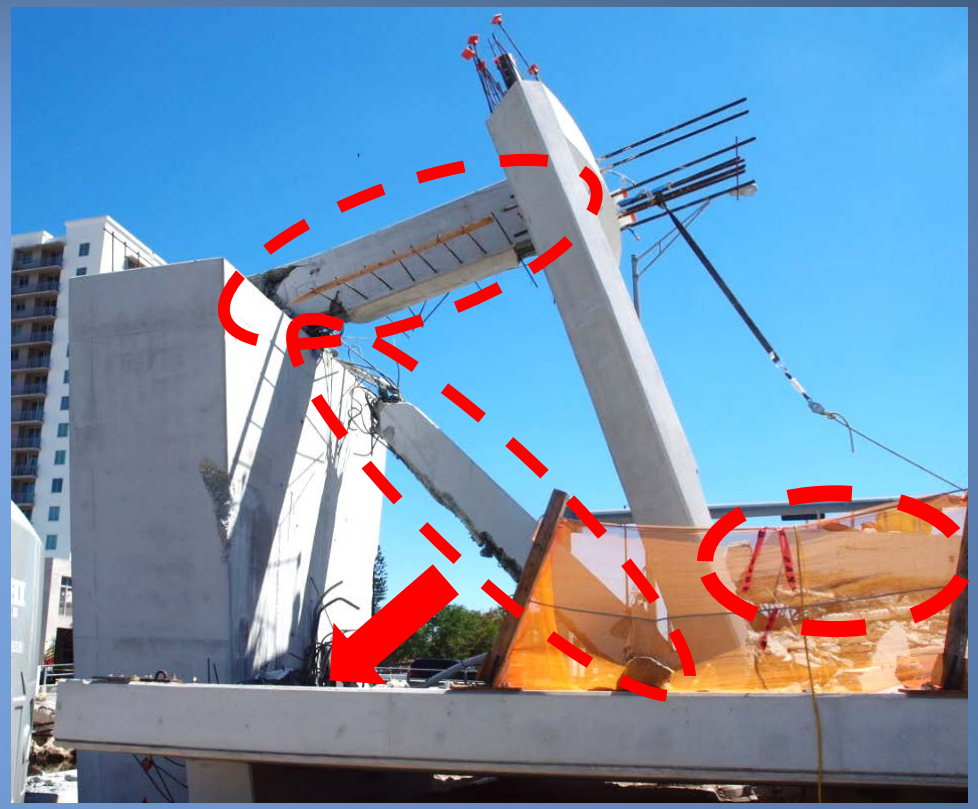
Large On-Scene Evidence Collected





- Canopy blister 10/11
- Member 11

- Member 12
- Deck at node 11/12

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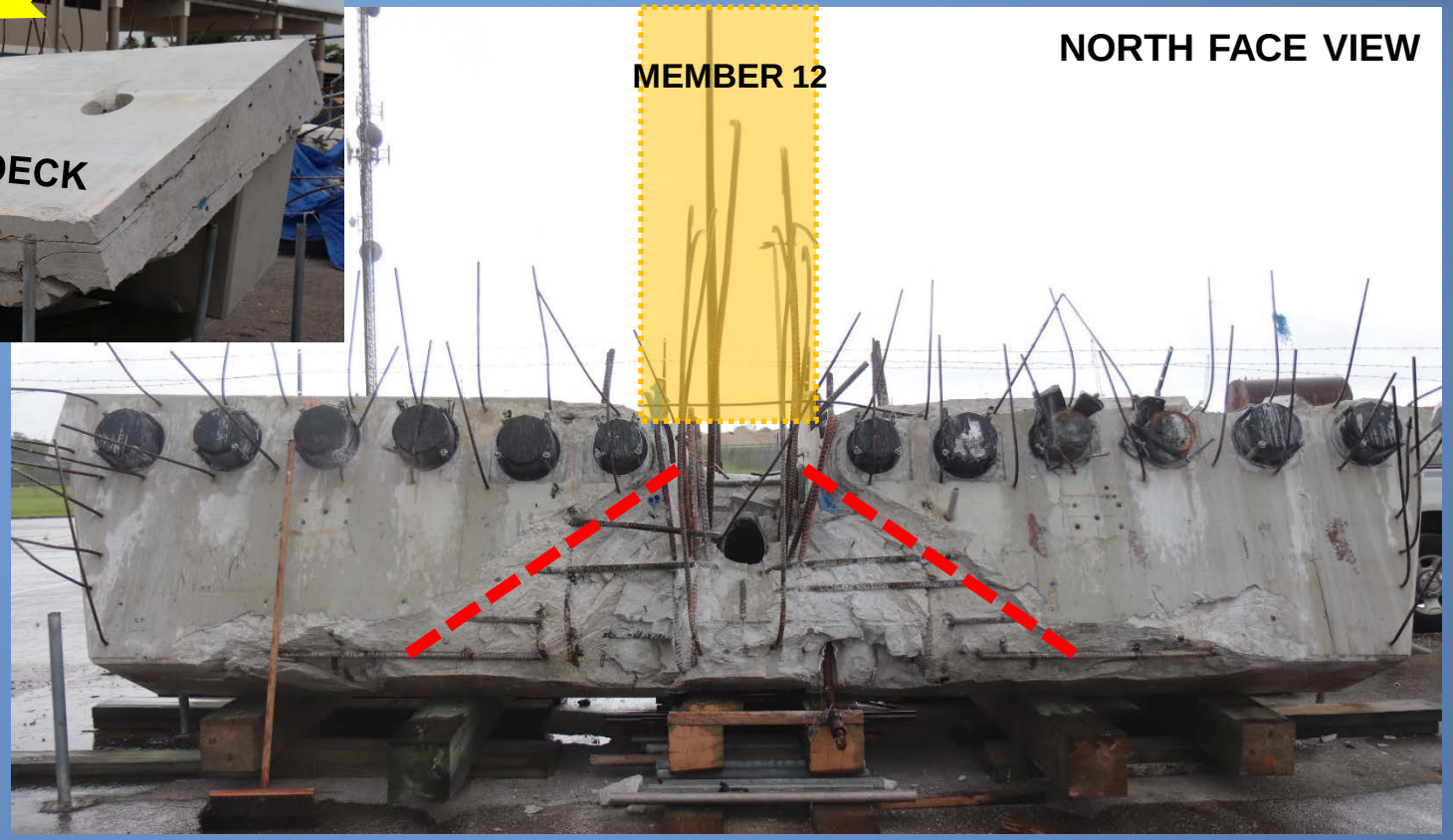
Evidence from Node 11/12 in Deck



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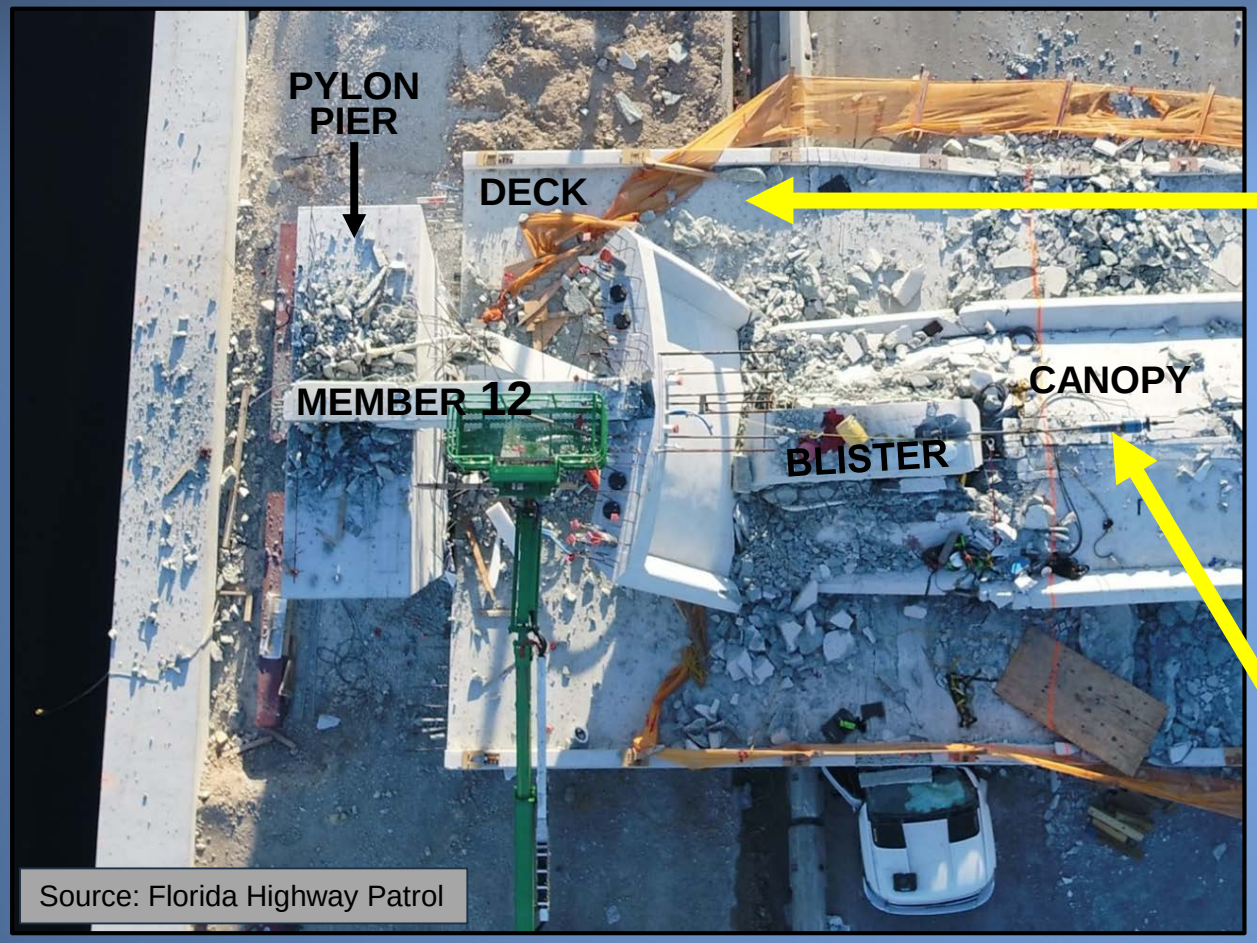
Concrete and Equipment Evidence Collected



Source: Florida Highway Patrol

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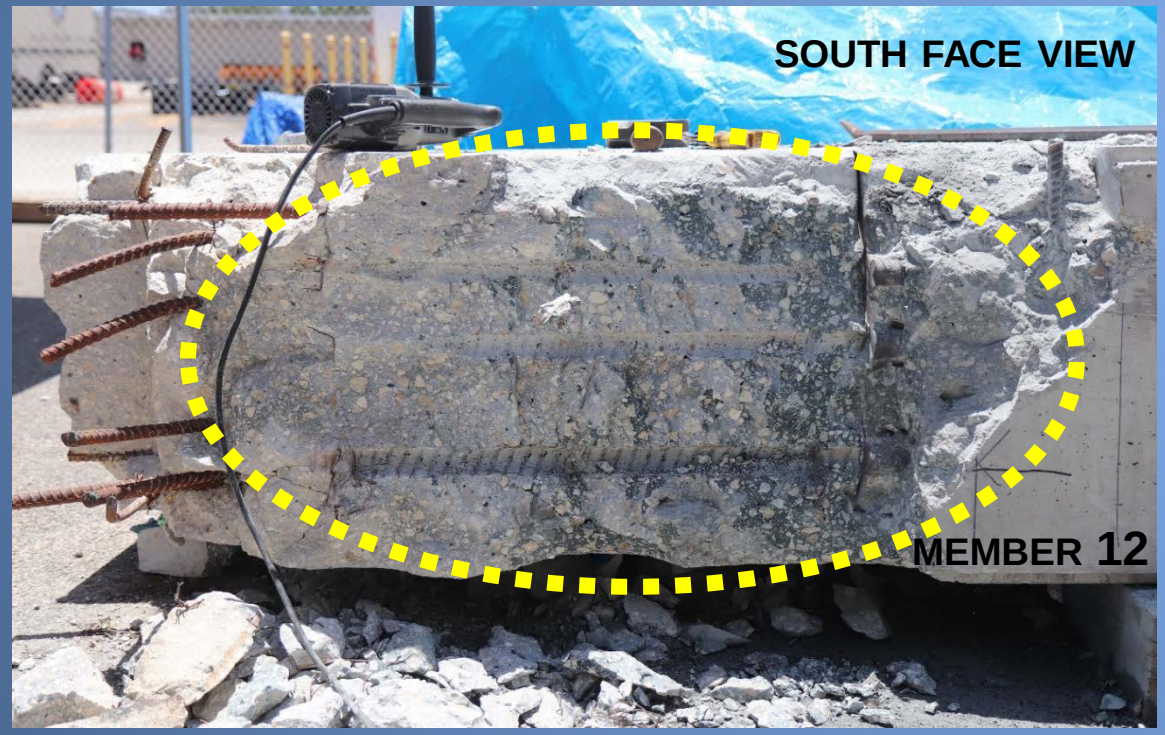
Steel PT Rods and Reinforcement Bars Evidence Collected



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TFHRC Materials Testing Results

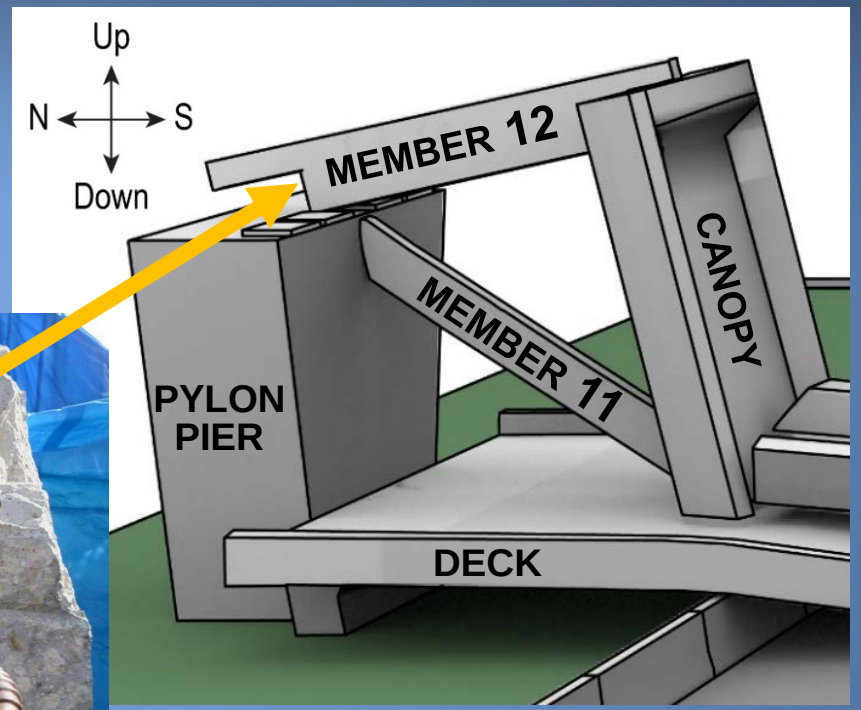
- Concrete
  - Tested compression strength
  - Examined internal structure
  - Evaluated tensile behavior
- Steel PT rods and reinforcement bars
  - Tested yield and tensile strength, percent elongation
  - Analyzed chemical composition of PT rods
- ***All material specimens were within specifications***

TFHRC Equipment Testing Results

- Position of internal components suggests equipment was performing a tensioning operation at time of collapse
- ***Post-tensioning equipment was operating normally at time of collapse***

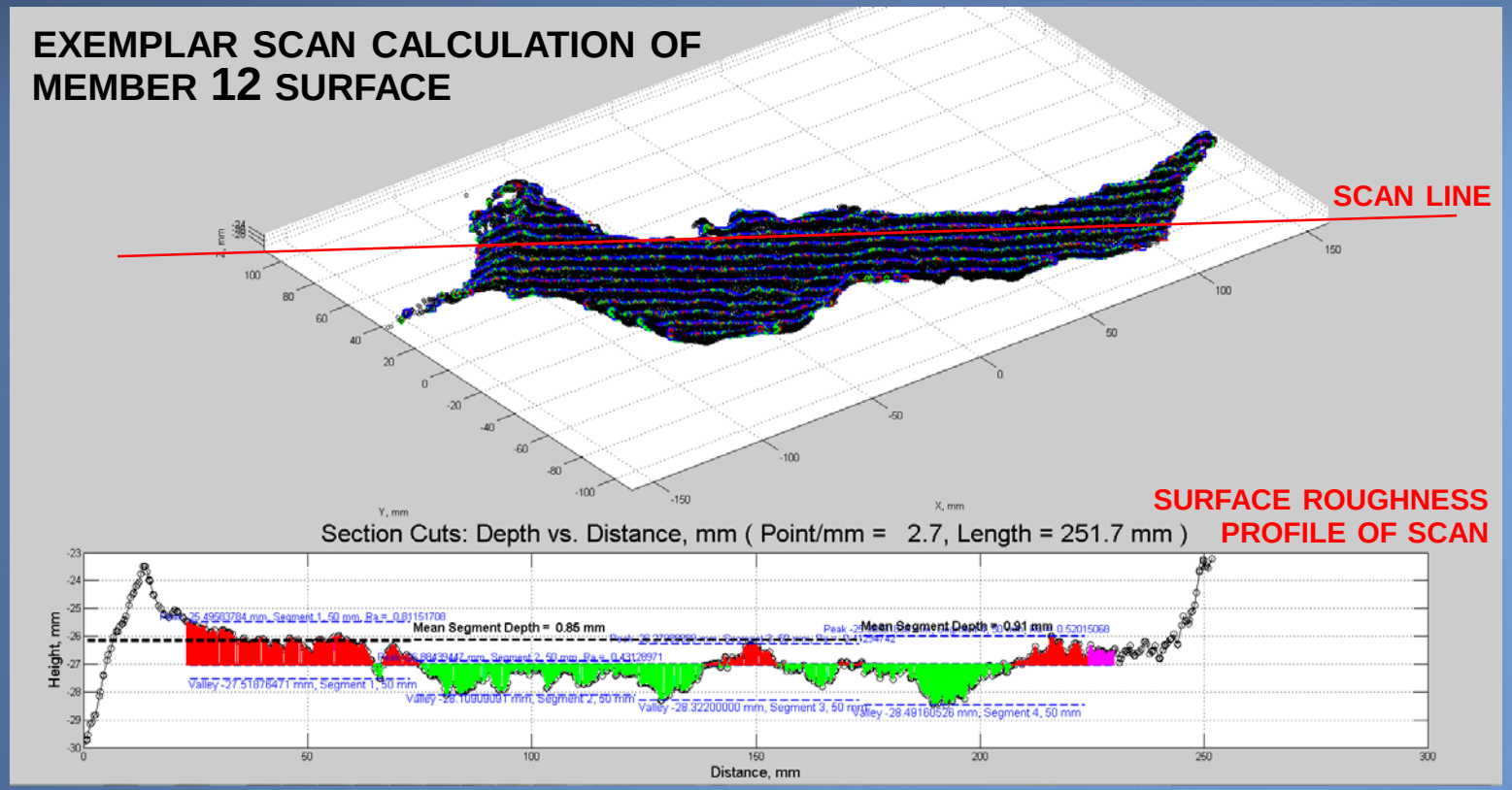
Postcollapse Surface Roughness Examination

- Roughened cold joints enhance performance
- AASHTO LRFD specifies roughened concrete to have 0.25-inch amplitude
  - FDOT does not specify a minimum amplitude



Bottom of member 12

Surface Roughness Direct Measurement



- NTSB developed technique using data analysis of laser scans
- Calculations show cold joint not intentionally roughened

- ***Had cold joint been roughened, bridge could still have failed***

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Summary

- Evidence testing results
  - Concrete, steel PT rods, and reinforcement bars were within specifications
  - Post-tensioning equipment was operating normally
- Surface roughness examination
  - Cold joint at node 11/12 not intentionally roughened
  - Even if cold joint had been roughened, bridge could still have failed